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Date: 12/12/2016

Dear Michael,

**Decision to approve changes to Scottish Hydro Electric Power Distribution (SHEPD) plc's Northern Isles New Energy Solutions (NINES) project**

We<sup>1</sup> have decided to approve the amendments you requested to Annex A of the Funding Request (which describes the project)<sup>2</sup> for the NINES project.

We have approved these amendments to Annex A of the Funding Request, because we consider they will mitigate the challenges presented by material changes in circumstances that were largely beyond SHEPD's control and which have arisen since the project commenced. These amendments to Annex A of the Funding Request will allow the project to continue with the objective to deliver value for money to distribution customers.

This letter describes the background to your requests to amend Annex A of the Funding Request for the NINES project, the process we have followed to assess the requests, our decision and the next steps for the project.

We will require the Integrated Plan<sup>3</sup> to identify and demonstrate the estimated benefits, economic and otherwise, of NINES in line with those presented in the analysis supporting your change request submission. There must be a robust evidence base to demonstrate that the deployment of the NINES solutions will reduce the maximum demand as predicted and that the expected reduction in the electricity units generated by fossil fuels will be achieved, to the extent possible under the new energy solution, which is as yet undefined. Failure to demonstrate this may lead to our review of the status of, and the costs incurred with respect to, this project.

**Background**

You proposed NINES as a pilot project and the first phase of your original Integrated Plan. The NINES project aims to trial a set of alternative solutions (including demand

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<sup>1</sup> References to 'the Authority', 'we', 'us' and 'our' are to the Gas and Electricity Markets Authority. The terms 'the Authority' and 'Ofgem' are used interchangeably in this document. Ofgem is the office of the Authority.

<sup>2</sup> "Annex A - Proposals for the development of the Integrated Plan for Shetland" to the Funding Request. The term Funding Request is used to refer to the Notice served by SHEPD on 18 November 2011 under CRC18.A and subsequently approved by Ofgem in Northern Isles New Energy Solutions (NINES) Project – Funding Determination on 25 November 2011.

<sup>3</sup> Ofgem rejected the Incentive Mechanism associated with the original Integrated Plan in 2014. SHEPD is now required to meet the obligation to propose the Integrated Plan through the development of the Shetland new energy solution competitive process, as set out in Ofgem's Determination Letter of 22 April 2014 .

side management (DSM) and energy storage) that could be implemented to reduce the overall cost of meeting the electricity needs of Shetland. The original expectation was that, on completion of NINES, you would use the learning to inform the second phase of the original Integrated Plan, including the replacement of the existing power station that supplies the Shetland Isles, Lerwick Power Station (LPS), with another power station. In particular, the solutions trialled by NINES were expected to allow a significant reduction in the installed generation capacity of the LPS replacement and to enable the connection of more renewable generators.

The NINES project consists of the implementation of the infrastructure necessary to actively manage demand and generation on Shetland. The elements of this infrastructure will be coordinated to maximise the amount of energy generated by renewable generation while maintaining quality and security of supply. The challenge is to balance the system using generation, demand, storage and actively manage network power flows. This project was considered to be unique in that the trials were to take place on a standalone system which has no electrical connection to the mainland. Consequently, the system balancing must work in order to maintain security of supply.

In carrying out NINES, two principal effects are achieved:

- a reduction in maximum demand; and
- a reduction in the electricity units generated by fossil fuels.

On 15 September 2011, we issued a decision on funding<sup>4</sup>. The funding determination issued on 25 November 2011 contains the specific conditions that you committed to in receiving funding for the NINES Project.

The funding determination requires you to comply with –

- Charge Restriction Condition (CRC) 18A of your Electricity Distribution Licence<sup>5</sup>; and
- the NINES Project funding conditions.

Amongst other things, you are required to: undertake the NINES project in accordance with the commitments you made in the full submission including Ofgem's approved changes; provide us with progress reports every six months; and inform us in writing of any events or circumstances likely to affect your ability to deliver the project as set out in your change request.

On 13 March 2013, you formally submitted two requests to amend the NINES Project Direction. Due to a fire in a similar installation in Japan you requested to allow the removal and return of the original NaS battery, to be modified and relocated elsewhere, in agreement with the manufacturer and supplier, and its replacement on Shetland with a lead-acid battery. Your second request was to approve to expand the offering of DSM beyond the social housing market due to Shetland Islands Council withdrawing from the scheme. You explained each material change in circumstance, the amendment to be made in response to the change and why the amendment was necessary. Ofgem approved the changes in May 2013.

On 4 March 2015, due to a number of material changes to the NINES project you submitted a further request to amend Annex A to the Funding Request which describes the project. We will only amend a project if a distribution network operator (DNO) is able to demonstrate that it experienced an event or circumstance likely to affect its

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<sup>4</sup> [http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES\\_Decision\\_Letter.pdf](http://www.ofgem.gov.uk/Networks/ElecDist/Policy/Documents1/NINES_Decision_Letter.pdf)

<sup>5</sup> <http://epr.ofgem.gov.uk/EPRFiles/SHEPD%20Plc%20-%20Special%20conditions%20-%20Current%20Version.pdf>

ability to deliver the project as set out by Ofgem. The amendment request can be found on our website.<sup>6</sup>

## **Process**

Following the submission of your change request, we have continued to meet with you and discuss your proposals. Throughout this process we have sought to ensure that the project will continue to deliver equivalent benefits to those outlined in its original full submission and which informed our decision to award NINES funding. We asked you to provide sufficient evidence to demonstrate that the amendments are appropriate and, in particular, that the amendments are in the best interests of distribution customers.

Due to the time constraints on the project, and the requirement for you to finalise Phase 1 of the Integrated Plan by 31 December 2016, we are not going to continue to explore the impact of the changes on the project benefits at this stage.

## **Summary of the change requests**

On 4 March 2015, you formally submitted a request to amend Annex A of the Funding Request (amendment request) for the NINES project. You explained each material change in circumstances, the proposed amendment to be made in response to the change and why the proposed amendment was necessary.

The two proposed amendments consist of three elements:

- the removal of the proposed 4MW boiler / 130MWh thermal store proposed by Shetland Heat Energy and Power (SHEAP) from the NINES project scope;
- a reduction in the size of the proposed Gremista Wind Farm from 6.15MW to 3MW, leading to an overall reduction in the NINES renewable generation managed connections from 11.545MW to 8.545MW; and
- a proposal that no further customer recruitment by SHEPD should take place associated with the Open Market DSM model.

In considering these requests, we have taken into account all the information provided by you within the change requests and supporting documentation.

## **Decision**

You have requested two amendments. We have described below our consideration of the evidence provided in each of the areas and our decision on whether to approve each amendment.

### *1. Gremista Wind Farm and Thermal Store*

The original NINES project submission included the installation of a 4MW-rated electrical boiler with 130MWh of thermal storage to supply the existing district heating scheme. The 4MW boiler was intended to be powered directly by the proposed 6.9MW Gremista wind farm through a private network with excess generation potentially also available to the island's network. The windfarm and hot water storage system were to be developed and maintained by SSE Renewables and SHEAP respectively.

Since then, you state that number of commercial issues proved difficult to resolve, including agreement on the terms of the power purchase agreement between the two parties. Following revisions to SSE Renewables own project and investment plans, it submitted a reduced capacity 3MW connection application for Gremista wind farm and

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<sup>6</sup> <https://www.ofgem.gov.uk/publications-and-updates/decision-approve-changes-scottish-hydro-electric-power-distribution-plc-s-northern-isles-new-energy-solutions-project>

started development in conjunction with a new investor, Shetland Aerogenerators Ltd, the owner and operator of Burradale Windfarm).

You also confirmed that the thermal store element of this work was put on hold by SHEAP, when it decided to review its position in terms of project funding and business case. SHEAP has since confirmed to SHEPD that the European Regional Development Fund funding it was applying to the project is no longer available as it had been conditional upon significant works being completed by March 2014 (the timing of the funding was renegotiated by SHEAP from December 2013).

You also highlighted that one of the two remaining consented bases remain and could be used for a direct connection to either a SHEAP storage facility (should SHEAP progress this outside of the formal scope of the NINES project and associated funding) or as a potential bid opportunity under the competitive process to procure a new energy solution for Shetland. You also confirmed and provided correspondence as evidence of the continuing engagement between SHEPD and SHEAP on alternative solutions.

We noted that you have proposed no adjustment to the allowance in relation to the Gremista wind farm reduced capacity as it was intended to be 100% externally funded since the start of the project and no allowance was included in the provision. Works proposed to facilitate the connection of the wind farm were still required, as are the works which took place to define commercial agreements between parties. The wind farm was connected in December 2015.

Reflecting the fact that the thermal store will not connect, you have identified savings for ancillary service payments of £450k (estimated by SHEPD as £150k per annum for 3 years) which would be absorbed by the ongoing project costs in other areas.

Based on the evidence provided, we agree that the events and decisions by third parties were outside of SHEPD's control. We are satisfied that Gremista wind farm has been connected with a reduced capacity of 3MW and have maintained engagement with SHEAP to find an alternative solution for the thermal store element of the project, but outside of the scope of the NINES project.

## 2. DSM

The original NINES submission included the installation of DSM into 750 homes provided by Hjaltland Housing Association and Shetland Islands Council (SIC). However, SIC announced in October 2012 that it would be withdrawing from the project. This resulted in a loss of over 500 of the 750 homes to be installed with new storage heaters and hot water tanks, along with communication to provide DSM capability.

In order to increase the number of domestic homes involved in the project (which stood at 234 domestic homes), Ofgem approved your request to expand the offering of DSM beyond the social housing market in May 2013 subject to there being no additional cost incurred to the total funding amount for NINES (£15.33m). Since then you have developed a proposal to bring forward the recruitment of 500 customers to provide DSM services as part of an enduring solution. You have refined the proposal, trialled a connection and have commenced the process to secure the 500 homes required by December 2016. You outline that you have received notice of interest from circa 200 customers and 16 customers have returned signed contracts intimating their desire to proceed. One trial customer has been connected to further clarify the connection process and highlight any difficulties this may cause. Following on from the trial installation a number of processes and procedural changes have been made to improve the customer experience and validation of the 16 signed contracts is still currently ongoing.

However, you now state that with the new obligation to undertake a competitive process which includes an invitation for the market to come forward with service offerings against reliable capacity, intermittent output, demand reduction and ancillary services, and also in light of the fact that SHEPD is likely to formally fulfil the SO role, you believe that the best option is for the NINES project to be split into its component parts and to allow the market itself to further develop enduring solutions as part of this competitive process. You also add that, an arrangement whereby SHEPD continues to have part responsibility to own / operate a solution for DSM while also expecting the market to come forward in competition with NINES DSM, seems unlikely to succeed and indeed is likely to be deemed as uncompetitive in the eyes of the bidders.

You have requested that Ofgem confirm that no further customer recruitment associated with the Open Market DSM model should take place by SHEPD. This would result in the removal of your previous commitment for 500 private homes to be added to the DSM elements of the project and lead to a total saving of £397k, but which would be absorbed by the ongoing project costs in other areas.

Based on the evidence provided, we agree to remove the requirement to connect the additional 500 private homes to the DSM element of the project by December 2016.

Approval of this change has no effect on any of the other project deliverables, in particular the learning element of the project. You have reassured Ofgem that, although there will be an impact on learning associated with the changes included within this request, it will be minimal in terms of the overall learning associated with the NINES project.

### **Other issues**

As per Ofgem's original determination of 2011<sup>7</sup> SHEPD must still provide a detailed report (the 'Close-Down Report') of sufficient detail to provide information for third parties to understand what has been learnt from the project. SHEPD must submit its Close-Down Report to the Authority within three months of the project completion date set out in this letter.

In the event that the Authority considers that a Close-Down Report is of an unacceptable standard, it may ask the SHEPD to resubmit the Close-Down Report.

This project may be subject to an audit. This will include requiring SHEPD to demonstrate that the project is compliant with this decision. This audit may be undertaken by the Authority, or by a third party appointed at the discretion of the Authority.

If you would like to discuss any of the issues raised in this letter, please contact Laurynas Jurkonis at [laurynas.jurkonis@ofgem.gov.uk](mailto:laurynas.jurkonis@ofgem.gov.uk) or 0207 901 1891.

The Authority hereby agrees to the amendments to Annex A of the Funding Request - Proposals for the development of the Integrated Plan for Shetland as set out in Appendix 1.

Yours sincerely,



Grant McEachran

**Head of RIIO Electricity Distribution**

Signed on behalf of the Authority and authorised for that purpose

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<sup>7</sup> Letter sent to Scottish Hydro Electric Power Distribution plc on 25 November 2011

## Appendix 1

### Annex A - Proposals for the development of the Integrated Plan for Shetland

#### 1. DEVELOPMENT OF THE INTEGRATED PLAN

- 1.1. During the ~~latest Distribution~~DPCR5 Price Control settlement, a licence obligation was put in place requiring Scottish Hydro Electric Power Distribution (SHEPD) to present an Integrated Plan to manage supply and demand on Shetland. The Shetland Islands are not connected to the main ~~interconnected~~ GB electricity network and, as such, face unique electrical challenges – but also a unique opportunity to decarbonise supply. Under the ~~current~~DPCR5 licence condition, this Integrated Plan ~~is was~~ to be presented to the Authority by 31 July 2013 and SHEPD ~~are was~~ required to demonstrate that it ~~has had~~ identified a solution based on the lowest lifecycle costs taking into account its environmental obligations.
- 1.2. As part of the Integrated Plan submission, SHEPD ~~is considering~~considered, amongst other things, the upgrading or replacement of Lerwick Power Station, the impact of third party generation requirements, the abundance of renewable energy resources and the future demand on Shetland.
- 1.3. The factors influencing the supply and demand issues on Shetland ~~necessitates~~necessitated an innovative approach to their management. However, with innovation comes the need to trial solutions before reaching an answer. As a result, SHEPD ~~propose originally proposed~~ to split the implementation of the Integrated Plan into two phases:
- Phase 1 Shetland Trial (Northern Isles New Energy Solutions 'NINES') – implementation of the infrastructure necessary to actively manage demand, generation, reactive compensation and energy storage assets. These elements ~~will be are being~~ coordinated to maximise the amount of energy harvested from renewable generation while maintaining supply quality and security. In doing so, two principal effects are achieved:
    - a reduction in maximum demand; and
    - a reduction in the electricity units generated by fossil fuels
  - Phase 2 (Shetland Repowering) – upgrading or replacement of Lerwick Power Station by SHEPD, taking into account the learning acquired during Phase 1 and, where appropriate, extending the Phase 1 technology.
- 1.4. ~~This information constitutes~~NINES was therefore specifically designed and developed to operate in conjunction, and integrated, with Lerwick Power Station or its replacement operated by SHEPD, with SHEPD having a detailed and overarching view of the operation of both NINES and the thermal plant, and the opportunities for savings brought about by NINES in this context. This information (this Annex A)

constituted SHEPD's compliance with CRC18A.15 to propose the Shetland Trial (NINES) by 31<sup>st</sup> October 2011.

1.5. This paper ~~constitutes originally constituted~~ SHEPD's proposal for Phase 1 of the Integrated Plan ~~and seeks which sought~~ to:—

- Outline the ~~current~~ arrangements and challenges on Shetland; ~~(as they were when the documents were originally developed, in the first half of 2013);~~
- Set out the Shetland Repowering considerations;
- Explain Phase 1;
- Set out the costs ~~for~~ Phase 1
- Identify the project delivery methodology and risks; and
- Outline a mechanism to amend the ~~current~~ licence obligation Special Condition CRC 18A to allow for Phase 1.

1.6. Phase 2 of the Integrated Plan ~~will continue~~ continued to be developed during the implementation of, and learning from, Phase 1. Phase 2 ~~will be~~ was presented to the Authority, as required, by 31 July 2013.

1.7. Following review of this submission, and of further Cost Benefit Analysis provided to Ofgem at its request on 23 December 2013, the Authority published its rejection of the proposed incentive mechanism associated with SHEPD's Integrated Plan on 22 April 2014, on the basis that Ofgem was "not persuaded that it adequately incentivises the efficient capital and operational costs of the Integrated Plan".<sup>8</sup>

1.8. The Authority set out new obligations for SHEPD to deliver, including:

- The running of a consultation process to ensure that all potential solutions and stakeholder considerations are explored;
- The running of a competitive process to identify the most efficient solution for Shetland; and
- The appointment of an independent auditor to oversee, agree and report to the Authority on the competitive process.

1.9. This document has been updated to reflect these developments and other changes specific to the NINES project.

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<sup>8</sup> <https://www.ofgem.gov.uk/ofgem-publications/87381/ofgemdeterminationofshepds submissionundercrc18a.pdf>

## 2. CURRENT ARRANGEMENTS AND CHALLENGES ON SHETLAND

### 2.1. Supply and Demand

2.1.a. The Shetland Isles are located some 130 miles to the north of the UK mainland.

2.1.b. The islands are not physically connected to the GB electricity system and, as such, rely entirely on local sources of generation. The main generation sources are: Lerwick Power Station (LPS), a 67MW diesel-fired station; the Sullom Voe Terminal (SVT) Power Station, which has an installed capacity of 100MW, but currently exports, ~~at most, 22MW~~ 15MW to the Shetland system; ~~and~~ Burradale Wind Farm, a ~~3MW~~ 3.68MW privately-owned wind farm; ~~and total value of 4.045MW of NINES connected generators~~. In addition, there are a number of small-scale community-based wind generators.

2.1.c. LPS is owned by SSE Generation and operated by SHEPD. The plant consists of two stations, 'A station' and 'B station', with six and three units respectively. 'A station' was first commissioned in 1953; 'B station' was commissioned in 1983. SHEPD calls on LPS to balance supply and demand on Shetland on an instantaneous basis and, in doing so, LPS is required to provide many of the ancillary services that would normally be offered to the system operator through a diverse plant portfolio; all of this places considerable demands on LPS. Given the age of the plant, LPS has become increasingly expensive to maintain and operate. Furthermore, it is becoming increasingly difficult to ensure environmental compliance in and around the station. The Scottish Environmental Protection Agency (SEPA) has granted LPS a number of derogations in terms of environmental compliance, most notably a relaxation of its emissions limits under ~~the Large Combustion Plant Directive~~ its Pollution Prevention and Control permit. However, these derogations are contingent upon clear steps being taken to either introduce adequate emissions controls or to replace the existing station.

2.1.d. SEPA is aware of the original provisions within ~~the current price control~~ DPCR5 for SHEPD to come forward with an Integrated Plan, including Shetland Repowering, by 31<sup>st</sup> July 2013, and the subsequent obligation to run a competitive process set out in the 2014 Determination, and the nature and timescales of the derogations reflect this. It is not ~~possible~~ considered cost-effective to retrofit the existing LPS in order to meet environmental standards due to constraints on the location and size of the site and the age of the existing engines. As such, this ~~has~~ was not ~~been~~ considered an option to be put forward in the Integrated Plan.

2.1.e. The SVT power plant is an independently owned gas turbine plant located in the north of the island. Its primary role is to supply the requirements of the Sullom Voe gas terminal, but through a commercial power purchase agreement with SHEPD, it also provides power to help meet the islands' wider energy requirements. The Sullom Voe plant is of a similar vintage to LPS and is anticipated to require refurbishment or replacement within similar timescales to



LPS. [Its owners have formally confirmed to SHEPD that supply under the PPA is uncertain from 2017.](#)

2.1.f. Burradale Wind Farm is located close to Lerwick. Burradale operates at an average output (capacity factor) of around 50% taken over a full year. Average European wind power capacity factors are closer to [2024%](#). Burradale Wind Farm therefore ranks among the most effective wind farms in the world. In more recent years, the introduction of feed in tariffs, in particular, has increased the interest in these types of installations on Shetland.

2.1.g. Demand on the islands varies between 11MW and 48MW and much of this is concentrated in the main town of Lerwick. It is important to note that these demand figures exclude SVT's industrial demand, which at present is supplied directly by the terminal's on-site generation. If SVT is taken into account, the total island demand is within the range 31MW and 68MW.

2.1.h. ~~Despite the~~ While Sullom Voe [is a](#) gas processing terminal, there is [currently](#) no gas supply on the island. The heat demand on the islands is therefore provided largely through oil boilers and electric storage heaters. For around 1,000 customers in Lerwick, their heating needs are met through the District Heating Scheme, which uses a waste to heat energy plant sited just outside Lerwick. This scheme is operated by Shetland Heat Energy and Power (SHEAP) Ltd.

2.1.i. Although the electricity supply in Shetland comes from only three [main sources](#), [\(LPS, SVT and distributed generation\)](#), all customers on the island can still choose who they wish to be supplied by in exactly the same way as mainland customers. In this respect, Shetland customers are able to fully participate in the liberalised GB energy market and continue to benefit from retail competition.

## 2.2. The Network

2.2.a. On the mainland, transmission networks (defined in Scotland as those of 132kV and over) collect power from generators and transport it to distribution networks, which then deliver the electricity to end customers. It is the responsibility of the GB System Operator, National Grid, to ensure that the power generated equals the power demanded.

2.2.b. However, as there are only lines of 33kV or below on Shetland, the existing network on Shetland is entirely at distribution voltages, i.e. the distribution network collects power from generators and delivers it to the end customers. SHEPD owns and operates this network and, in the absence of a mainland link, provides a system operator role to maintain a balanced system. This role has always existed, but was more formally recognised at the introduction of the British Electricity Trading and Transmission Arrangements (BETTA) in 2005, when provisions were made within SHEPD's distribution licence to allow it to recover its resulting costs.

2.2.c. As with any network, maintaining the balance between generation and demand is critical. As Shetland is not [currently](#) connected to the mainland, the

network must be balanced using only the assets available on the islands. In other words, at any given time, there cannot be more generation than demand, or vice versa, and to be able to achieve this, a significant percentage of this generation must have a reliable and controllable output. ~~At present~~Prior to the advent of NINES, the balance ~~is was~~ such that it ~~is was~~ not possible to offer any new generation connections on the islands. The current mix of generating plant ~~is was~~ not sufficiently flexible enough to cope with any additional intermittent renewable generation whilst maintaining network stability. This ~~is was~~ particularly true during the summer where the low demand on the islands ~~makes made~~ it impossible to accommodate any further renewable generation. If new generation was to be introduced without equivalent new demand to warrant it, the system would ~~behave been~~ at risk of becoming unstable ~~and this would result~~resulting in a loss of supply.

### 3. WIDER CONSIDERATIONS FOR SHETLAND'S ENERGY SYSTEM

3.1. We have already described the pressures facing the main sources of generation on Shetland. The islands' repowering, [originally envisaged to be achieved through SHEPD's Integrated Plan, and now being delivered through the competitive process](#), is a unique opportunity to review the islands' arrangements as a whole and to develop an integrated solution designed to make the most of Shetland's renewable resources and reduce its dependency on thermal generation.

3.2. There are, however, a number of wider issues that need to be considered.

#### 3.3. Securing supplies to Shetland

3.3.a. SHEPD has a licence obligation to ensure that supplies to Shetland are maintained to Engineering Recommendation P2/6. This recommendation states that, for a location the size of Shetland, there must be an alternative means of maintaining supply to the area in the event of a fault.

3.3.b. It is this obligation which fundamentally drives the requirement for a reliable and efficient local power station on Shetland, as opposed to relying on intermittent renewable generation, third party contracts or a single mainland HVDC cable link. These sources might form a part of the solution. However, to comply with P2/6, SHEPD must be sure that if any one energy source was not available, an alternative supply was there to be deployed.

#### 3.4. New demand

3.4.a. The scale of any replacement thermal generation plant will be directly related to the islands' peak demand. Ignoring the industrial load at SVT, which is met by on-site generation, the islands' peak demand, at present, stands at 48MW.

3.4.b. Given our duty to offer terms for connection on request, and the [lack of constraints on](#) generation capacity to meet this demand, SHEPD [will make has made](#) any [current material](#) demand connection offers contingent on the proposed mainland link. Going forward, there may be additional demand requirements and the [Integrated Plan new energy solution](#) should allow for this to be accommodated.

#### 3.5. Mainland link

3.5.a. A plan to build a single circuit HVDC link to the mainland has been developed to facilitate the connection of proposed large-scale renewable generation on Shetland, [from Viking Wind Farm and potentially other projects](#), into the main GB system.

3.5.b. This link to the mainland is expected to operate with around a 98.5% reliability factor. Therefore, Shetland can expect a link to the mainland much of the time but must still have an alternative means of supply for the times when the cable is unavailable. This is particularly important as, due to the challenges of access to subsea cables, repair of faults or routine maintenance in these kind

of cable links are likely to be of a significantly longer duration than those on overhead lines.

3.5.c. The Integrated Plan [set out that an islanded solution](#) is ~~therefore~~ necessary regardless of whether ~~the a single circuit~~ mainland link exists or not, [in order](#) to meet the requirement for a reliable local power supply- [which can meet all of Shetland's demand](#). In ~~particular~~[addition](#), the learning from Phase 1 ~~can~~[may](#) be applied to any enduring solution, be it a full duty station or a standby station.

[3.5.d. In the event that other mainland link proposals are progressed, the requirement for an islanded power supply alongside any such proposal and any existing links would be determined through security of supply assessment and other relevant analysis.](#)

### 3.6. Viking wind farm

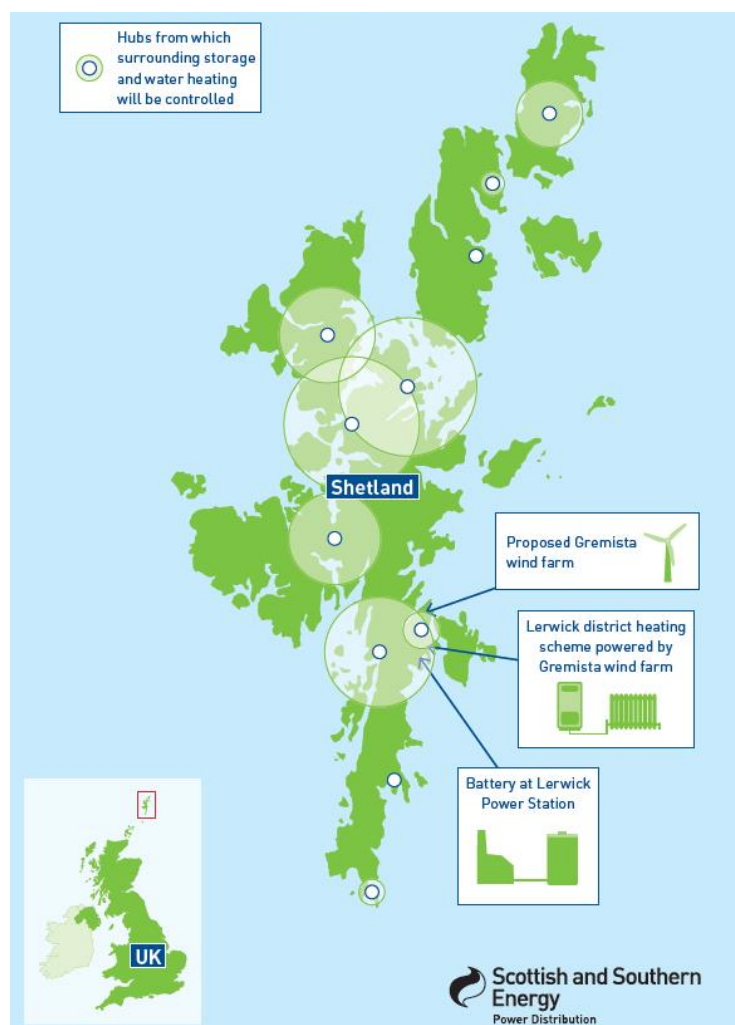
3.6.a. As mentioned in 3.5.a, there are proposals for a large-scale (around 450MW) onshore wind farm on Shetland. In light of these proposals, consideration has been given to the contribution that this wind farm could make to the continuation of supplies on the island during a fault on the mainland HVDC link.

3.6.b. Based on evidence from existing Shetland wind farms, it is anticipated that the output of this wind farm will be less than the demand on Shetland for up to 30% of the year. As such, this wind farm, on its own, is insufficient to secure supplies on the islands. In addition, it cannot be guaranteed to have sufficient output in the event of loss of the HVDC link, [and there would also be significant stability issues to address associated with managing output from such a wind farm when any link was down](#).

### 3.7. New small and medium scale wind generation

Given the abundance of renewable resource on Shetland, there is significant potential for small and medium scale wind generation on the islands. The connection of this renewable generation ~~wa~~[is](#) an important driver for the Integrated Plan, [and is now managed largely through the NINES Active Network Management system. Shetland's renewable generation is also a key element of the new energy solution. However, given the constraints set out at section 2.2.c., it is recognised that it is unlikely that there can be any significant increase in renewable generation on the system unless facilitated by a mainland link and associated export arrangements](#).

## 4. PHASE 1 (NINES) OF THE INTEGRATED PLAN



4.1. Phase 1 of the Integrated Plan ~~has been~~ was developed with the main aim of informing the optimum repowering solution. Whilst its primary objective ~~will be~~ is to trial 'smarter' initiatives, importantly it ~~will fund~~ has funded elements and infrastructure that we fully expect to endure as part of Phase 2 of or alongside the Integrated Plan new energy solution.

4.2. The Phase 1 approach was previously explored in a bid, titled 'NINES', under the Low Carbon Networks Fund (LCNF).

4.3. When reviewing the original 'NINES' LCNF submission, Ofgem recognised the value of the project in addressing the current challenges on Shetland and noted that - *'aspects of the NINES project solution could potentially provide a lower carbon and lower cost approach to meeting the energy needs of Shetland compared to replacing the ageing Lerwick diesel power station with a similarly sized diesel plant.'*

4.4. The ~~current~~ Phase 1 approach, whilst technically identical to 'NINES', ~~has been~~ was somewhat refocused on providing infrastructure and learning specifically for Phase 2 of SHEPD's original Integrated Plan, rather than having a broader UK focus.

4.5. There has been significant support, both on Shetland and further afield, for what the original 'NINES' project was intended to achieve. Given that the output, for the islanders, of Phase 1 ~~will be~~ has been very similar to the proposals in 'NINES', we

~~intend to brand~~have 'branded' the Phase 1 approach as 'NINES' in order to provide continuity.

4.6. Central to the project ~~will be~~has been the creation of an integrated set of models designed to anticipate the impact of NINES. This set of models ~~is expected to cover~~covers the following themes:

- Dynamic Stability modelling
- Steady State modelling
- Unit Scheduling modelling
- Customer demand forecast model
- System Development optimisation model
- Strategic Risk and Operational risk model
- Shetland Economic model
- Commercial model

4.7. During ~~p~~Phase 1 these models ~~will be validated to allow them to be used to inform phase 2 with the level of certainty that would be required for such a significant investment~~have been validated for use in informing Phase 2, specifically the Lerwick Power Station replacement.

4.8. Facilitated by modelling and practical learning the aims of Phase 1 ~~are~~have been to:

4.8.a. Undertake specific projects that increase understanding of how best to accommodate Shetland's significant wind potential on a small distribution network; and

4.8.b. Undertake specific projects that increase understanding of how the existing and known future demand on the island can be best managed on a constrained, isolated system.

4.9. The purpose of Phase 1 ~~being~~was to inform the design of Phase 2 of the Integrated Plan and, specifically, through trial and learning optimise the supply and demand infrastructure on the islands.

4.10. There are six core elements in delivering the Phase 1 project and these elements are set out below. However, one of the key early outputs from Phase 1 ~~will be~~is a series of models. As stated earlier these models ~~will serve~~have served to predict the behaviour of the energy systems on Shetland and ~~will~~to validate each of the key elements of Phase 1 as they ~~are~~were added. Following this validation process, these models will be used to ~~reliably~~inform the design of any replacement of Lerwick Power Station: realised through the competitive process. Overall, with the successful operation of Phase 1, we ~~expect to create~~have created the infrastructure and know-how to reduce the peak capacity requirement for any replacement ~~power station by up~~solution to 11MWa level dependent on the particular assets connected, and the characteristics of the new solution. The NINES project assets are described below.

#### 4.11. 1MW battery at Lerwick Power Station

4.11.a. A 1MW battery ~~will act~~ is acting as an energy storage system and in addition to facilitating the connection of new renewables, the battery ~~will seek~~ is seeking to help to optimise and stabilise the operation of the existing island network by helping to reduce demand peaks. ~~Initial models suggest, conservatively, that~~ To date the battery ~~can~~ has helped to accommodate the connection of ~~up to 400kW~~ 4.045MW of new small scale renewable generation. ~~As SHEPD gains with a greater understanding of the battery's operational performance, it is envisaged that~~ further renewables can 4.5MW due to be connected ~~as confidence~~ some time in the system and the associated models ~~increases. Once commissioned, it will be~~ 2016. This is the largest battery in use anywhere on the GB network.

4.11.b. The capital cost of the battery ~~is being~~ has been part funded by DECC via a Smart Grid Demonstration Capital Grant for £1.1m and £1m from SHEPD's First Tier Low Carbon Network Fund. The remainder ~~will be~~ was funded through Phase 1 and the learning will inform the battery's role in the ~~repowering solution (Phase 2 of the Integrated Plan)~~ context of the new energy solution.

#### 4.12. Domestic demand side response with frequency response

4.12.a. SHEPD ~~is working~~ has worked with Hjalmland Housing Association to install advanced storage heating and water heating in ~~around~~ 234 existing homes. ~~Following the loss of SIC we also plan to recruit a further 500 private homes, brining the total under the project to 734.~~ These new storage and water heaters (which ~~will replace~~ replaced existing traditional storage heaters) ~~are being~~ were provided through Hjalmland and ERDF funding and have been specifically designed to use a much more flexible electrical charging arrangement. This new charging arrangement ~~will be~~ is determined based upon the predicted demand, weather forecasts, availability of renewables and any other network constraints.

4.12.b. These heaters ~~will~~ incorporate additional insulation to minimise heat loss and ~~will be~~ are fitted with programmable timers to allow users much better control of temperature and operating times as compared with conventional storage and water heating systems.

4.12.c. The new heating system is ~~anticipated~~ designed to be more efficient, while also ~~allows~~ allowing the customer full control of both temperature and operating time and ~~equally allows~~ allowing for charging at times that best suit the network.

4.12.d. This initial roll out ~~will~~ was intended to help to gauge how effective storage and demand side response is at the domestic level. If successful, it ~~is~~ was anticipated that this could be voluntarily extended ~~(if customers chose to give 1000 take it up) to additional~~ homes and ultimately with the theoretical potential to be rolled out, through customer choice, to all electrically heated houses in Shetland. This ~~can~~ could be achieved at relatively low incremental cost ~~as if using~~ the communications infrastructure and core Active Network Management scheme ~~will which is~~ already be in place to service the original ~~750~~ homes. ~~It is anticipated that this will~~ This initial roll out was also intended to give the opportunity to

provide further learning on implementing these new storage heaters within the private sector.

4.12.e. The programme for the initial installation within the 234 HHA properties ~~is phased from May 2013 to July~~ was completed in November 2014. ~~Therefore, extending SHEPD had planned to partner with Shetland Islands Council (SIC) to connect to and control, through NINES, heating and hot water systems in a further 500 homes. Following the loss of SIC, we originally planned to continue to progress with the recruitment of 500 private homes, bringing the total number of homes under the project to 734; however this solution will form part of Phase 2 of the integrated~~ the project was halted pending clarity on the outcome of the competitive process and the new energy solution. Any extension of this solution and will that forms part of the new energy solution will be informed by the learning in Phase 1.

**4.13. Additional 'flexible' demand through 130MWh thermal store rated at 4MW**

4.13.a. Shetland Heat Energy and Power (SHEAP) ~~is originally proposeding~~ to extend the existing Lerwick district heating scheme by installing a 4MW electrical boiler, which will be linked to a new thermal store capable of storing around 130MWh of hot water. The existing district heating scheme is currently supplied by waste heat from the islands waste to energy plant and also relies on significant quantities of oil to meet the requirements of the scheme.

4.13.b. The new boiler and thermal store ~~will~~ was to provide the capacity to extend the over subscribed district heating scheme and ~~will~~ also substantially reduce the current scheme's reliance on oil.

4.13.c. Aside from helping meet the demand for connections to the district heating scheme, the real benefit intended to be offered by this arrangement is was expected to come from the thermal store's ability to respond instantaneously to situations arising on the network. For example, if there is was insufficient demand on the island system relative to generation, the intention is was that SHEPD will be able to call on SHEAP's thermal store to increase island demand and 'soak up' the surplus generation, thereby helping to maintain a balanced system. Similarly, if the reverse situation arises, the intent is was that SHEPD ~~can~~ could ask SHEAP to withhold its demand until a time when the system is was more able to accommodate it.

~~4.13.d. Clearly, for this to work, the commercial framework between SHEPD and SHEAP will have to reflect both the needs of SHEAP's customers, who are reliant on the thermal store for their heating and hot water, and the needs of SHEPD in terms of ensuring that SHEPD has this flexibility at times when it is of value. These arrangements will be informed by early modelling that is part of the Phase 1 project. The actual elements of this proposal are forecast to connect mid to late 2014 and, once connected, will be able to further validate the overall model that will inform Phase 2 of the Integrated Plan that is to be submitted to the Authority in July 2013. However, clearly, once installed this learning does not~~



~~stop and we envisage that we will be able to reflect further on this learning ahead of actual repowering during Phase 2.~~

~~4.13.e. To supply power for the boiler and thermal store, SHEAP is in discussions with SSE Renewables to bring forward a 6.9MW wind farm on adjacent land. The capital costs of the store and its onsite generation will be funded by the respective partners. This new wind farm will be connected to the boiler via a private electrical network, with any surplus electricity being exported to the grid. This will be a 'managed connection' whereby the wind farm will only be able to export if network conditions are suitable. Additionally, taken together, the boiler and thermal store will be able to provide a range of ancillary services for both the new wind farm and also for other renewables.~~

~~4.13.f. Whilst the capital costs of the store and its onsite generation will be funded by the respective partners, the focus of the Phase 1 funding will be on understanding and testing the commercial agreements needed to make this arrangement work. These include agreements for managed generation connections, flexible demand connections including ancillary services agreements and payments. If successful, these agreements will encourage other potential customers to come forward to provide connections on a similar basis which will help inform Phase 2 of the Integrated Plan.~~

4.13.d. Unfortunately, subject to issues outside of SHEPD's control, SHEAP have now formally confirmed that they will no longer be pursuing the development of a thermal store.

#### 4.14. **Renewable generation**

4.14.a. Shetland has some of the richest renewable resources in Europe and there is significant interest on the islands to connect a range of new renewable generators. ~~These are primarily~~There is a mix of wind and tidal generators and currently connected that range in scale from ~~10kW~~45kW up to ~~7MW~~4.5MW. However, ~~this generation cannot~~before the advent of NINES these generators could not connect to the ~~current system~~network due to the underlying voltage and stability constraints. Connecting more renewable generation, which is unavoidably intermittent, would ~~exacerbate~~have exacerbated these problems.

4.14.b. To address this, Phase 1 ~~will~~has ~~trialled~~trialled an active network management regime which ~~will seek to~~has ~~offered~~offered renewable developers ~~an earlier~~connections ~~date.~~date. In return, they ~~will be~~are required to give their agreement to being constrained when the system cannot accommodate their generation. ~~It is hoped that the~~The measures that ~~are being~~have been developed and trialled under Phase 1 ~~will reduce~~are reducing this constraint by being able to actively provide demand when there is renewable resource available.

4.14.c. Indeed, these arrangements ~~will~~could be necessary even if Shetland is to become electrically connected to the mainland at some point in the future. ~~Our understanding is that the economic case for a mainland link only allows for a single HVDC cable. If a single mainland link is~~ damaged, this could result in a prolonged outage, which would mean that Shetland would once again be

electrically islanded. Therefore, even then, the prospect of and ability to constrain will remain for generators on Shetland, albeit on a less frequent basis.

4.15. The following table summarises the current status of applications including details of the completed and current expected connection dates as applicable.

	<u>Capacity</u>	<u>Current Status</u>	<u>Original Connection Offer Date</u>	<u>Current Expected Connection Date</u>
<u>Cullivoe Tidal, Yell</u>	<u>45KW</u>	<u>Accepted as 1<sup>st</sup> Small renewable</u>	<u>December 2013</u>	<u>Connected April 2014</u>
<u>Garth Windfarm, Yell</u>	<u>4.5MW</u>	<u>Accepted as 1<sup>st</sup> Large renewable</u>	<u>May 2015</u>	<u>4th Qtr. 2016</u>
<u>Luggies Knowe (formally known as Gremista) Windfarm, Lerwick</u>	<u>3MW</u>	<u>Accepted as 2<sup>nd</sup> Large renewable</u>	<u>May 2015</u>	<u>Connected December 2015</u>
<u>Shetland Tidal, Yell</u>	<u>500KW</u>	<u>Accepted as 3<sup>rd</sup> Large renewable</u>	<u>October 2014</u>	<u>100kW connected December 2015, with a further 200kW in June 2016. The remaining 200kW to be connected at a later date.</u>
<u>North Hoo Field Windfarm, Lerwick</u>	<u>500KW</u>	<u>Accepted as 4<sup>th</sup> Large renewable</u>	<u>February 2014 (Accepted on a Non Contestable works only)</u>	<u>Connected November 2014</u>

#### 4.15.4.16. Active Network Management (ANM) system

4.15.a.4.16.a. This is the Phase 1 project's nerve centre: it ~~will~~ monitors the different parameters affecting the network, including embedded constraints, frequency stability and weather and ~~will~~ manages an appropriate response. It ~~will~~ responds to, and ~~tunes~~ tunes, the models, which ~~have~~ are being developed to monitor and understand how new storage assets will behave. This ~~is being~~ has been funded entirely through ~~Phase 1, but will~~ the DPCR5 UNC and RIIO-ED1 NOC allowances. SHEPD will assess whether the ANM system is able to continue to provide the ~~is~~ core functionality for the enduring ~~new energy~~ solution ~~through Phase 2.~~

4.15.b.4.16.b. By creating flexible demand on the island we ~~have made progress in expect to be able to exploiting and~~ maximiseing Shetland's wind generation potential ~~and minimise on an islanded basis, and in reducing the capacity of generated output from replacement~~ thermal generation. ~~Whilst the Phase 1 project will see an increase in the overall electrical demand on Shetland through the use of electricity rather than oil in SHEAP's existing district heating system, it will allow for a higher proportion to be delivered from renewable sources.~~

~~4.15.c.4.16.c.~~ Initial studies suggested ed that it should ~~ultimately~~ be possible to reduce the peak demand by up to 11MW, facilitated through the NINES project elements set out above. This was primarily based upon the storage solutions and flexible demand offered through application of the Active Network Management system working alongside a number of different technologies, including:

- The ~~new~~ 1MW battery at Lerwick Power Station (1MW of storage);
- The installation and active network management of storage and water heaters in 1850 homes (which may have offered the potential to flex up to 9MW of existing demand); and
- SHEAP's thermal store and associated extension (funded by SHEAP and ERDF) to the current district heating scheme (which offers may have offered up to 1MW of flexible demand).

4.17. A key driver for the trial has been understanding how some of these elements work and interact in a real-life environment. ~~Whilst in theory~~ The above trial elements offered SHEPD up to a theoretical maximum of ~~20MW of~~ storage / flexible demand at any one time, and the early learning from Phase 1 ~~has~~ demonstrated that 11MW was the maximum winter peak load reduction achievable, and f Further learning from Phase 1, will demonstrateing to what extent this is actually available in practice, led to SHEPD providing an update to Ofgem on the contribution of NINES as part of the Integrated Plan submission in July 2013, noting a reduced but significant expected mid-case contribution from the project.

~~4.16.4.18.~~ As noted, the domestic demand side response currently extends to 234 homes, and the thermal store has not been progressed and is therefore not available to contribute to the project. In general terms (with the exception of additional renewables), all NINES technologies predominately involve energy shifting rather than energy reduction. This will give SHEPD the confidence it needs in order to be able to incorporate these elements on a larger scale as a part of the overall Shetland repowering proposal in Phase 2.

~~4.17.4.19.~~ Importantly, the above initiatives as part of this first phase of Phase 1 target involve just 8% of customers 234 homes on the islands. There is therefore scope to use the learning from this phase to provide wider benefits on the island. The wider potential for the storage and water heaters is, for example, already being explored. The key is that by using this first phase of Having used Phase 1 to provide and verify the infrastructure and the impact of the Active Network Management solution, the incremental cost of widening the scope of the trial is minimal. It is therefore our view that an 11MW reduction in the peak demand is a realistic objective in terms of the full repowering solution likely to be lower than developing an entirely new solution, whether this is achieved by SHEPD under NINES or by other third parties through solutions which are successful under the competitive process.

~~4.18.4.20.~~ As well as reducing the peak demand on the islands and therefore the size of any replacement thermal generation, (as originally envisaged in the context of SHEPD's Integrated Plan), the Phase 1 project also has wider benefits:

- Phase 1 ~~will seek~~has sought to significantly increase the volume of renewable energy that can be connected to the islands' network.
- In the medium to long term, by managing demand and increasing the amount of renewable generation on the islands, the requirement for ~~LPS~~ will energy supplied by thermal generation should be reduced. This ~~will~~should result in lower fuel costs and reduced operation and maintenance costs at thermal plant, including Lerwick Power Station. ~~It is estimated that the initial elements of the project committed during the Phase 1 deployment will result while it remains in an annual reduction in operating costs of approximately £1.1m per annum dependant on final fuel choice. This is reduction in costs expected to increase as Phase 1 progresses and more storage and renewables are connected.~~operation.
- Phase 1 ~~has already~~ attracted ~~a significant level of~~ external funding ~~(up to £21m), some elements of which are already approved and committed such as (£3.26m in total), including~~ the c.£1m Smart Grid Demonstration Capital Grant Programme from DECC, and the c.£1.0m from ERDF and Hjaltland Housing Association for the energy efficient storage heating systems. ~~Other partners, including Shetland Heat Energy and Power, SSE Renewables and Smarter Grid Solutions, continue to develop their elements of the project and are still fully committed to delivery of Phase 1. The involvement of these partners will ensure the earliest possible delivery of the elements of Phase 1.~~
- ~~In addition, we believe that a good~~The opportunity exists to access further external funding ~~for Phase 2 in future~~, should elements of Phase 1 form part of an innovative solution ~~for this at a~~ later stage. ~~Compared with this more innovative approach, a more conventional solution is much less likely to attract external funding which would result in SHEPD customers having to pick up the excess costs of providing a supply on Shetland in full.~~

~~4.19.4.21.~~ The principle aim of Phase 1 (NINES) ~~is~~was originally to inform Phase 2 of the Integrated Plan (as originally envisaged by SHEPD), and more recently the future enduring solution for Shetland as identified through the competitive process. ~~The effect of this~~ knowledge will be applied with the aim of ~~to~~ de-risking the relevant decisions in relation to this next P~~phase-2~~.

## 5. THE CAPITAL COST FOR NINES

5.1. The cost profile of delivering Phase 1 is set out in Table 2 below. ~~Importantly, whilst this phase will cost £33.54m in total to deliver; SHEPD customers will fund less than half of this.~~

**Table 1: Phase 1 cost profile**

<b>£m (10/11 prices)</b>	<b>10/11</b>	<b>11/12</b>	<b>12/13</b>	<b>13/14</b>	<b>14/15</b>	<b>15/1 6</b>	<b>16/1 7</b>	<b>Total</b>
Total	<del>1.36</del> <u>1.1</u> 5	<del>6.89</del> <u>5.0</u> 5	<del>5.75</del> <u>4.0</u> 4	<del>13.44</del> <u>4.2</u> 5	<del>6.10</del> <u>2.5</u> 2	<u>1.32</u>	<u>0.26</u>	<del>33.54</del> <u>18.5</u> 9
External costs	1.15	<del>2.05</del> <u>1.0</u> 5	<del>1.80</del> <u>0.1</u>	<del>7.11</del> <u>0.86</u>	<del>6.10</del> <u>0.1</u>			<del>18.21</del> <u>3.26</u>
SHEPD costs	<del>0.21</del>	<del>4.84</del> <u>4.0</u>	<del>3.95</del> <u>3.9</u> 4	<del>6.33</del> <u>3.39</u>	<u>2.42</u>	<u>1.32</u>	<u>0.26</u>	15.33

## 6. PROJECT DELIVERY

6.1. The NINES Project ~~will be~~ has been delivered in accordance with SHEPD's Large Capital Project Governance Framework and its associated documents and procedures. This process has been prepared to assist in the delivery of approximately ~~£6.7bn~~ £7.4bn of capital investment over the period 2000-~~2013~~ 2016. This process is compulsory for all capital projects with a value over £10m.

~~6.2. Project Governance structure is appended and the sponsorship and engagement of senior management reflects the profile and level of support afforded to this project. It also includes the range of external partners committed to the delivery of the NINES project.~~

~~6.3.6.2.~~ 6.3.6.2. SHEPD's preparation for delivery of this project ~~has~~ included development of detailed Work Packages for the various elements. Key early stage activities ~~have been scoped in detail ready for commencement~~ included:

~~6.3.a.6.2.a.~~ 6.3.a.6.2.a. Detailed design and subsequent procurement process for the 1MW battery ~~have been concluded.~~ Installation commenced in April 2010. Following significant technical difficulties following a fire in a similar installation, SHEPD ~~have agreed to continue with a strategy to replace~~ replaced the original battery with an alternative technology. The replacement battery is expected to commence installation was completed in July ~~February~~ 2014 and ~~be fully operational by October 2013~~ it is now being utilised for peak demand reduction.

~~6.3.b.6.2.b.~~ 6.3.b.6.2.b. Following the decision by Shetland Islands Council to withdraw from the project in October 2012, Hjalmland Housing Association, along with a range of partners including SHEPD, ~~have~~ secured approximately £1m of ERDF funding as part of a programme to upgrade heating and hot water installations in 234 homes on the Islands. ~~An initial 6 home trial commenced in 2010 to meet ERDF /SHQS standards with full roll out for the HHA homes planned to commence in July 2013~~ These installations were completed in November 2014.

~~6.3.c.6.2.c.~~ 6.3.c.6.2.c. Partners SHEAP and SSE Renewables ~~have~~ jointly developed necessary information to submit planning application for Gremista Wind Farm and associated electric boiler. Planning permission for the Gremista windfarm was secured in February 2012. However, subject to issues outside of SHEPD's control, SHEAP have formally confirmed that they will no longer be pursuing the development of a thermal store.

~~6.4.6.3.~~ 6.4.6.3. SHEPD ~~has~~ established significant full-time resource, along with collaborator resource, for the delivery of the project.

## 7. PROJECT RISKS

7.1. Risk management ~~will be~~ has been conducted in accordance with SHEPD's Large Capital Project Governance Framework Manual. This document requires the Project Director to be responsible for the creation of a register of risks, containing as a minimum, SHE, commercial, reputation, intellectual property, development, construction and operational risks and shall be compiled, complete with costed mitigation and planned responses.

~~7.2. The current Risk Register is appended~~

~~7.3.7.2.~~ \_\_\_\_\_ The risk register ~~will be~~ has been developed and is monitored throughout the project to identify all risks and associated mitigating actions.

7.3. The risk register is continually updated and an abstract is included in the 6 monthly progress reports which are submitted to Ofgem.

## 8. RISK MONITORING

- 8.1. As stated previously the NINES project ~~will behas been~~ delivered in accordance with SHEPD's Large Capital Project Governance Framework. Risk Management is a fundamental element of our Framework.
- 8.2. As identified in the Organogram (~~Appendix 2~~) the Project Director ~~will beis~~ responsible for:
- 8.2.a. The overall co-ordination of relevant project materials – risk/issue registers; planning; document control; finance control and project status reporting.
  - 8.2.b. Preparing materials for the monthly Project Review Board.
- 8.3. The Project Development Manager and Project Delivery Manager ~~will beare~~ responsible for preparing regular control reports.
- 8.4. Risk monitoring procedures ~~will beis~~ in accordance with SHEPD's Large Capital Project Governance Framework and associated documents.
- 8.5. The Project's risk monitoring procedures ~~will beare~~ supported by ~~the establishment of a~~ Project Review Board for quality management and ~~technical review~~ purposes. ~~See Appendix 2: Organogram~~
- 8.6. The Project Board ~~will beis~~ drawn from relevant SHEPD personnel, whose credentials in this area are vital to the status of the Project and ~~will provide~~ an essential 'peer review' of the project.
- 8.7. The implementation of Phase 1 of the Integrated Plan (the 'NINES' project) ~~is has~~ ~~provided~~ an excellent opportunity to trial an innovative approach to active network management on an isolated system. Using the learning obtained from Phase 1, ~~Phase 2 of the Integrated Plan will deliver a more enduring new energy solution should be better~~ informed and cost-effective ~~solution to Shetland Repowering~~.



## 9. INCREMENTAL LEARNING

9.1. Shetland's current status as an electrical island, not connected to the UK grid, makes it the ideal research environment where rigorous study can be undertaken at a manageable scale.

9.2. We anticipate that learning from this project will continue to inform and address, amongst others, the following areas:

9.2.a. How can a distribution system be securely operated with a high penetration of renewable generation?

9.2.b. What is the relationship between intermittent generation and responsive demand, including storage?

9.2.c. Areas in which we will generate most learning will include the effectiveness of frequency responsive demand side management, maintaining network stability in an active operational environment and the interaction of the numerous variables on Shetland's closed electrical system.

9.2.d. What is the economic impact on industry participants and other stakeholders of the low carbon operation of the network?

9.2.e. What new commercial arrangements are needed to support a low carbon network?

9.2.f. What is the impact of the low carbon network on domestic and industrial customers?

9.2.g. Key learning points ~~will~~ include the effect on fuel poverty, changes of attitudes, awareness and behaviours amongst consumers and the extent of the financial impact on participants.

9.2.h. To what extent do the new arrangements stimulate the development of and connection to the network of more renewable generation and reduce the area's reliance on fossil fuels?

9.2.i. What effect does the NINES project and its legacy have on Shetland's economy and on the area's carbon footprint?

## 10. LEARNING DISSEMINATION

- 10.1. Learning from the NINES project ~~has been and~~ will continue to be disseminated in a wide variety of ways, reflecting the breadth of knowledge that the project ~~will generate-is generating.~~ The dissemination ~~method will be~~ methods are tailored to each audience, although clearly there ~~will be~~ are efficiency-driven overlaps where one dissemination route serves a number of audiences.
- 10.2. Efficiency is as relevant to this part of the project as to all others and we will periodically review the way in which we are disseminating information to ensure it delivers the most useful learning to the most relevant audiences.
- 10.3. The key communication methods for sharing learning to the relevant audiences are noted below:
- 10.3.a. Industry - SHEPD ~~will continue~~ continues to integrate NINES within all of its LCNF dissemination activities along with all of our current and future IFI, Tier1 and Tier 2 projects. For example SHEPD ~~has presented NINES –at the Low Carbon Network Conference in July~~ a number of events and conferences and we will continue to do this as the project progresses. Information ~~will be~~ is being made available to industry participants via a variety of methods, including conferences ~~and~~ , seminars and newsletters, via the ENA and professional bodies including the Institute of Engineering and Technology. Industry participants ~~will also be~~ are alerted to the publication of academic papers produced by the academic modelling team. ~~It is also proposed to arrange a~~ A number of workshops to share project learning with key industry participants have been arranged.
- 10.3.b. Academia - Key to the academic learning is the publication of papers in relevant journals and online, and their presentation at key technical committees.
- 10.3.c. Community – Ongoing communication with all our stakeholders is an essential element and regular formal and informal meetings ~~will be~~ are held with stakeholders on Shetland and on the mainland. ~~This will build on previous events including the NINES launch held in Lerwick in February 2011, which was followed by an informal ‘surgery’ for potential applicants to discuss their particular requirements.~~
- 10.3.d. Online – SHEPD ~~will develop~~ has developed a NINES website to update on project progress and share learning.

## **11. IPR ARRANGEMENTS**

11.1. At present it is proposed that the IPR arrangements are broadly in line with those proposed in our original LCNF submission.